

# **EXHIBIT 33**

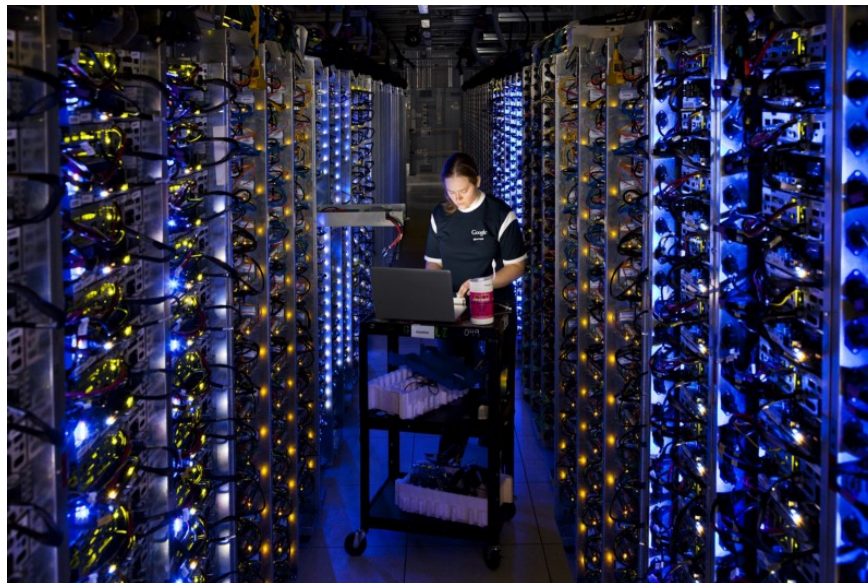


Waymo Team

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## Reliving the past: how these data centers drive us three million miles each day.

*January 2016*

Testing on public roads is a vital part of developing our software, allowing us to drive in new environments and come across new experiences. But with the powerful driving simulator that we've developed we're also able to learn without a single car leaving the garage.

Our engineers are regularly adding new capabilities and refining the car's driving by making improvements to the software. Before we roll out any change to our fleet of cars, we first test it extensively in this virtual environment.

One benefit of teaching a computer to drive is that it has great memory and recall. With our simulator, we're able to call upon the millions of miles we've already driven and drive those miles again with the updated software. For example, to make left turns at an intersection more comfortable for our passengers, we modified our software to adjust the angle at which our cars would travel. To test

this change, we then rerun our entire driving history of 2+ million miles with the new turning pattern to ensure that it doesn't just make our car better at left turns, but that the change creates a better driving experience overall.

We can also create entirely new scenarios in our simulator, allowing us to concentrate on perfecting a particular skill. For example, to test our car's performance in a three car merge, we will create thousands of variations of this situation (each car traveling at different speeds, and nudging to merge at different times) and then test that our car drives as intended each time.

Our simulator can also help our test drivers and engineers quickly identify any areas for improvement. Each time a test driver takes over from the self-driving car, we're able to play back the exact situation and predict via simulation what could have happened if the car had been left to drive itself. If the simulator shows better driving is called for, our engineers can make refinements to the software, and run those changes in simulation in order to test the fixes.

All together, we drive more than 3 million miles in simulation every day. That's the equivalent of circling the equator five times, every hour. All of this simulated driving requires huge computing power and luckily we're able to call upon Google's data centers for help.

